NOISE

Specific suggestions are provided to address data gaps related to construction noise in the affected environment report. In general, the report contains the appropriate level of detail and coverage for a technical appendix. The impacts report should focus on two general issues: construction noise and noise from installed facilities. Some of the listed noise criteria need to be corrected. Blasting noise should be addressed; data tables are attached.

Conformance to Outline

Noise

Affected Environment

- The Noise Affected Environment technical report follows items 1.0 through 4.0 of the 4/18/97 outline, but does not follow items 4.1 through 4.8 (breakdown of study area into regions). A discussion of existing major noise sources by region would be useful, however, if there are not substantial location-specific distinctions in noise settings, then the regionalization would not be necessary and may, in fact, be redundant.

Environmental Consequences

- The Environmental Consequences section of the technical report uses a modified version of the 6/25 outline for the No Action Resource Condition. However, for all alternatives it also breaks down impacts into Phase I and Phase II impacts. Additionally, for program actions, it consolidates impacts of Alternatives I, II, and III, into single analyses for Phase I and Phase II. Only Phase II Alternatives are discussed by region. Although this structure does not conform with either outline, it is very effective in reducing redundancy for this topic, which is not tied to specific geographic boundaries.

- The formats of the technical reports are not entirely consistent with the format guide; capitalization and underlining are inconsistent with the guide, however, heading levels are internally consistent.

REVIEW COMMENTS
CALFED BAY-DELTA PROGRAM PEIS TECHNICAL REPORTS
NOISE

AFFECTED ENVIRONMENT

No.	Page/Para	Comment
1	2.0, Intro	Referencing the reader to the noise appendix for a discussion of noise terminology is acceptable when the impact assessment contains little quantitative data. If quantitative information on construction noise or blasting noise are added to the impact discussion, then a brief explanation of noise terminology would be appropriate in the introduction.
2	3.0, Sources of Info	This section is appropriate for an appendix document, but is not necessary for the EIS/EIR text. Instead, the EIS/EIR text should cite relevant references as necessary.
3	4.1, Reg. Setting	If quantitative data are added to the impact assessment, then it might be useful to add the land use compatibility chart from State General Plan Guidelines for noise elements.
4	4.2, Comm. Noise Levels	While Table 1 presents a nice sequence of 5 dB noise increments for different intensities of development, the listed noise levels generally underestimate "typical" noise conditions.
5	4.2, Comm. Noise Levels	An Ldn of 40-45 dB is probably more typical of undeveloped areas. If undeveloped areas have meaningful vegetation cover of more than a few inches height, average noise levels will be determined by typical wind conditions. Ldn levels can easily reach 55 dB or more in windy areas. Flowing water, large flocks of birds, and other wildlife can also contribute significantly to noise levels in undeveloped areas.
6	4.2, Comm. Noise Levels	Very few suburban areas have Ldn levels as low as 45 dB. Urban and suburban areas that front on major roadways will have typical Ldn exposures at least 5 dB higher than the values noted in Table 4-1.
7	Tech. Appendix	As noted above, it might be desirable to move some of the narrative discussion to the Affected Environment section if quantitative analyses are added to the noise impact discussion.
8	Tech. Appendix	If information on blast noise is added to the impacts analysis, then it may be necessary to expand the discussion of noise metrics to discuss the use of C-weighted and unweighted (peak overpressure) decibel scales.
9	Tech. Appendix	The tabulation of perception responses to dB changes should probably be modified somewhat, especially with respect to a 1 dB change. Even in a laboratory setting few people can reliably differentiate a change of 1 dB or less. Outside a laboratory setting, a 1 dB change will not be detectable. A 2-3 dB change is generally detectable outside a laboratory setting. Why list an increase of 8-9 dB as "twice as loud" when the text and standard convention cite a 10 dB increase as a doubling of apparent loudness?

ENVIRONMENTAL IMPACTS/ CONSEQUENCES

No.	Page/Para	Comment
1	1.0, Intro.	This section is appropriate for a stand-alone appendix document, but it does not belong in the EIS/EIR text. Any introduction for the impact assessment text should focus on identifying the noise issues which will be addressed in the impact analysis. There are only two general noise issues of concern: construction noise, and noise from operation of installed facilities and equipment (pumping plants, etc.).
~~2~~	~~2.0, ES~~	~~Why is the Executive Summary the second section instead of the first section?~~
3	2.2, Summ. of Mitig.	All of the listed mitigation measures are directed at construction noise. It would probably be appropriate to identify enclosures and/or exhaust vent silencers as mitigation measures for pumping plants, emergency generators, or other operational facilities that are potential noise sources.
4	3.0, Assess. Methods	This section is appropriate for the stand-alone appendix document, but is not necessary for the EIS/EIR text. Any necessary references and methodolgy discussions can be incorporated into the impact assessment discussion.
5	4.0, Signif. Criteria	The first significance criterion makes reference to "Criterion C", but the criteria do not have letter designations. It would be better to present the construction noise criterion first, then merge the remaining criteria into a single presentation with appropriate subsections. Since subcriteria 2 and 3 use the same numerical values, they could be merged into a single subcriterion. For clarity, the 5 dB increment criterion should be related to existing Ldn conditions that are 5 dB or more <u>below</u> the normally acceptable limit; "within 5-15 dB" could be interpreted as being either above or below the normally acceptable limit.
6	5.0, Environ. Impacts	Many of the subsection headers need some work. They are excessively wordy, refer to "resource conditions" rather than impacts, or reference "Phases" that were not used for headers in the Air Quality Impacts report. Drop the "resource conditions" phrasing. Refer simply to alternatives. The header for Section 5.0 already says that this is the impacts discussion. If there is a "Phase II" to be analyzed, why isn't there a "Phase I"?
7	5.2.2, Gen. Construction	The generic construction site noise level cited on page 9 (83 dBA at 50 feet) is too low for construction sites that employ multiple items of equipment. It is also too low for even single units of most earthmoving equipment. A more representative noise level would be 85-90 dBA at 50 feet when multiple equipment items are operating in proximity (i.e., bulldozers pushing a scraper; front-end loaders and power shovels loading trucks; etc.). With a 10-hour daytime construction schedule, Ldn increments would drop to 65 dB at about 500 feet from the construction site. In the absence of nighttime construction activity, this would an approximate boundary of potentially significant noise impacts.
8	5.2.2, Blasting	Blasting noise can be difficult to evaluate quantitatively, since there are few readily available blast noise models. As indicated in the discussion, limits on charge quantities and/or requirements for cover depths can be set to limit estimated peak overpressures to 122 dB at sensitive receptors. This will avoid

		structural damage issues, but may not avoid annoyance effects if more than a few detonations are required.
9	5.2.2, Blasting	Most readers won't understand the differences between peak overpressures, peak dBA, or average dBA; just as importantly, most readers will try to relate the 122 dB peak overpressure value to construction equipment noise levels or land use compatibility Ldn criteria. Thus, some additional information regarding the zone of significant blast noise effects would be helpful.
10	5.2.2, Blasting	Attached to these comments are some charge weight/receptor distance tables for construction blasting with 40% dynamite in a 4-foot hole. As a very generalized approximation, peak dBA levels will be about 27 dB lower than the peak overpressure value. For shallow construction blasting that detonates less than 10 pounds of 40% dynamite at one time, peak overpressures would be less than 122 dB at distances of more than 300 feet. Corresponding peak dBA levels would be less than 85 dBA at distances of more than 600 feet. As a point of comparison, peak dBA levels are about 85 dBA at 50 feet for a 3-axle truck driving by at 35 mph.

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PEAK BLAST NOISE (dBA) FOR TYPICAL CONSTRUCTION BLASTING, 40% STRAIGHT DYNAMITE

CHARGE WEIGHT (POUNDS)	PEAK NOISE LEVELS UNDER CONDITIONS OF VARYING CHARGE WEIGHT AND DISTANCE									
	RECEPTOR DISTANCE (FEET)									
	100	200	300	400	500	750	1,000	2,000	5,000	10,000
0.5	89.1	80.6	75.6	72.0	69.2	64.1	60.4	51.3	38.8	28.9
1.0	93.6	85.1	80.0	76.5	73.7	68.5	64.9	55.8	43.3	33.4
2.5	99.3	90.7	85.7	82.1	79.3	74.2	70.5	61.5	49.0	39.0
5.0	103.4	94.8	89.8	86.2	83.4	78.3	74.6	65.6	53.1	43.1
7.5	105.7	97.2	92.2	88.6	85.8	80.7	77.0	68.0	55.4	45.5
10	109.0	100.5	95.4	91.8	89.1	83.9	80.3	71.2	58.7	48.7
15	114.8	106.2	101.2	97.6	94.8	89.7	86.1	77.0	64.5	54.5
20	118.6	110.1	105.1	101.5	98.7	93.6	89.9	80.8	68.3	58.4
25	121.4	112.9	107.9	104.3	101.5	96.4	92.7	83.7	71.1	61.2
30	123.6	115.1	110.1	106.5	103.7	98.6	94.9	85.9	73.4	63.4
35	125.5	116.9	111.9	108.3	105.5	100.4	96.7	87.7	75.2	65.2
40	127.0	118.5	113.4	109.8	107.1	101.9	98.3	89.2	76.7	66.7
45	128.3	119.8	114.7	111.2	108.4	103.3	99.6	90.5	78.0	68.1
50	129.5	120.9	115.9	112.3	109.5	104.4	100.7	91.7	79.2	69.2
55	130.5	122.0	116.9	113.3	110.6	105.4	101.8	92.7	80.2	70.2
60	131.4	122.9	117.9	114.3	111.5	106.4	102.7	93.7	81.1	71.2
65	132.3	123.7	118.7	115.1	112.3	107.2	103.5	94.5	82.0	72.0
70	133.0	124.5	119.5	115.9	113.1	108.0	104.3	95.3	82.7	72.8
75	133.7	125.2	120.2	116.6	113.8	108.7	105.0	96.0	83.4	73.5

A relative wind heading of 0 degrees is directly toward the modeled receptor location.
A relative wind heading of 180 degrees is directly away from the modeled receptor location.

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BLASTNZ1 Scenario:

Noise level scale =	Peak dBA	
Wind speed in mph =	7	mph
Relative wind heading (0 = toward receptor) =	0	degrees
Charge cover in feet =	4.0	feet
Blast spectrum code (1 = commercial explosives, 2 = C4) =	1	
TNT equivalency factor =	0.65	
Terrain shielding/echo factor =	0	dB
Temperature, degrees F =	75	F
Stability (1 = moderately unstable, 2 = slightly unstable, 3 = neutral, 4 = inversion, 5 = mod. focus, 6 = strong focus) =	3	
Percent relative humidity =	35	percent
Study area altitude in feet =	50	feet

Peak dBC	Risk of Complaint:	Peak Overpressure (dB)
< 105 dBC	Low risk of complaint	< 110 dB
105-120 dBC	Moderate risk of complaint	110-125 dB
120-125 dBC	High risk of complaint	125-130 dB
125-135 dBC	Possible damage claims	130-140 dB
> 135 dBC	Possible structural damage	> 140 dB

The BLASTNZ1 model is based on the peak overpressure equation presented in Rodman (1985) plus the buried charge correction equation from Raspet and Bobak (1988). Adjustments for wind conditions use relative wind headings (0 = toward the receptor location). Adjustments for atmospheric stability

C-004224

conditions are based on equations modified from Raspet and Bobak (1988). Atmospheric absorption equations are from Acoustical Society of America (1978). The relative frequency spectrum for commercial explosives is from Rodman (1985). The relative frequency spectrum for military explosives is from U.S. Army Construction Engineering Research Laboratory (1979). TNT equivalency factors taken (in order of priority) from Raspet and Bobak (1988); Esparza (1986); and Baker, et al. (1983).

Acoustical Society of America. 1978. American National Standard Method for the Calculation of Absorption of Sound by the Atmosphere, ANSI S1.26-1978 (ASA 23-1978).

Baker, W. E., P. A. Cox, P. S. Westine, J. J. Kulesz, and R. A. Strehlow. 1983. Explosion Hazards and Evaluation. Elsevier Scientific Publishing Co. New York, NY.

Esparza, E. D. 1986. Blast measurements and equivalency for spherical charges at small scaled distances. International Journal of Impact Engineering 4(1):23-40.

Raspet, R. and Bobak, M. T. 1988. Procedures for Estimating the Flat-weighted Peak Level Produced by Surface and Buried Charges. (USA-CERL TR N-88/07; AD-A199 857.) U.S. Army Corps of Engineers Construction Engineering Research Laboaratory. Champaign, IL.

Rodman, C. W. 1985. Calculation of blast noise using spreadsheet software. Pp. 363-370 in R. Singh, (ed.), NOISE-CON 85 Proceedings: Computers for Noise Control, 1985 National Conference on Noise Control Engineering. Noise Control Foundation. New York, NY.

U.S. Army Construction Engineering Research Laboratory. 1979. Acoustic Directivity Patterns for Army Weapons. (Technical Report N-60.) Champaign, IL.

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Peak dBC	Risk of Complaint:	Peak Overpressure (dB)

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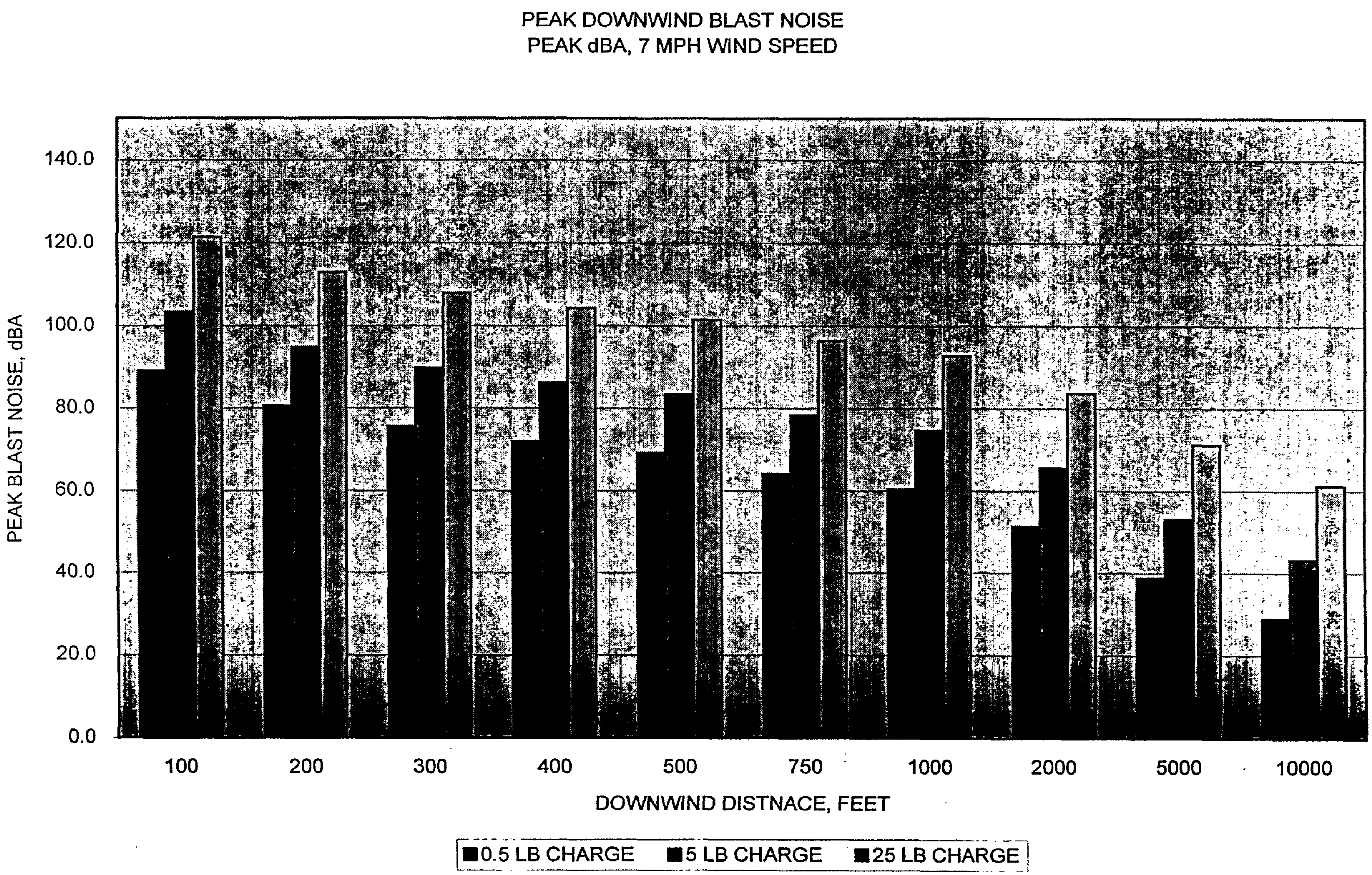

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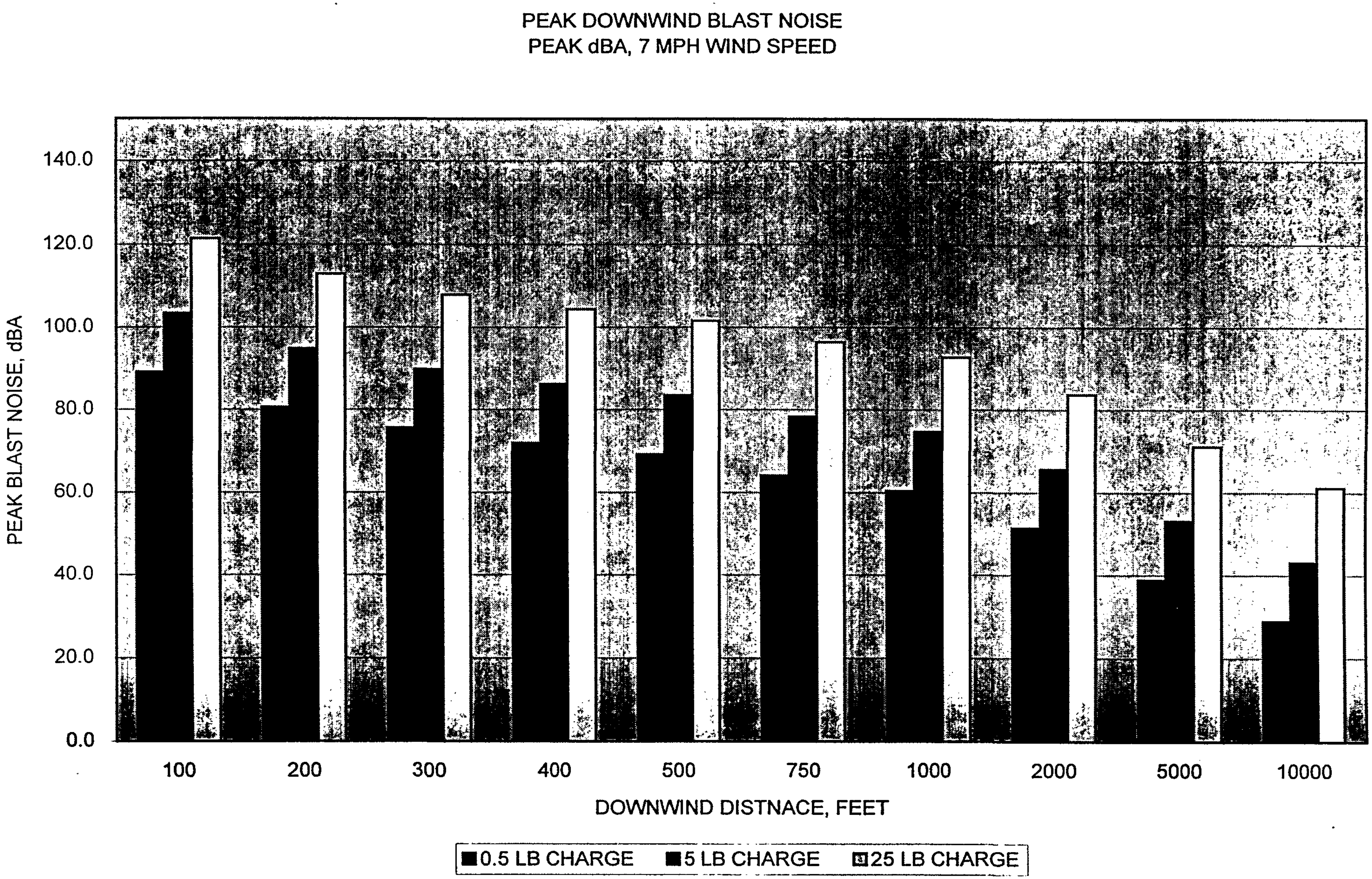
PEAK DOWNWIND BLAST NOISE
PEAK dBA, 7 MPH WIND SPEED
PEAK BLAST NOISE, dBA
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
100
200
300
400
500
750
1000
2000
5000
10000
DOWNWIND DISTNACE, FEET
0.5 LB CHARGE
5 LB CHARGE
25 LB CHARGE

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C-004228

105 dBC Low risk of complaint < 110 dB
105-120dBCate risk of complaint 110-125 dB
120-125 dBCgh risk of complaint 125-130 dB
125-135 dBCssible damage claims 130-140 dB
> 135 dBCible structural damage > 140 dB

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GRAPH SET-UP:

	100	200	300	400	500	750	1000	2000	5000	10000
0.5	89.1	80.6	75.6	72.0	69.2	64.1	60.4	51.3	38.8	28.9
5	103.4	94.8	89.8	86.2	83.4	78.3	74.6	65.6	53.1	43.1
25	121.4	112.9	107.9	104.3	101.5	96.4	92.7	83.7	71.1	61.2

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PEAK BLAST NOISE (dBA) FOR TYPICAL CONSTRUCTION BLASTING, 40% STRAIGHT DYNAMITE
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PEAK BLAST NOISE (dBC) FOR TYPICAL CONSTRUCTION BLASTING, 40% STRAIGHT DYNAMITE

CHARGE WEIGHT (POUNDS)	PEAK NOISE LEVELS UNDER CONDITIONS OF VARYING CHARGE WEIGHT AND DISTANCE — RECEPTOR DISTANCE (FEET)									
	100	200	300	400	500	750	1,000	2,000	5,000	10,000
0.5	106.0	97.5	92.6	89.0	86.3	81.3	77.8	69.2	57.8	49.0
1.0	110.5	102.0	97.1	93.5	90.8	85.8	82.3	73.7	62.3	53.5
2.5	116.1	107.7	102.7	99.2	96.4	91.5	87.9	79.4	68.0	59.1
5.0	120.2	111.8	106.8	103.3	100.6	95.6	92.0	83.5	72.1	63.3
7.5	122.6	114.1	109.2	105.6	102.9	97.9	94.4	85.8	74.4	65.6
10	125.9	117.4	112.4	108.9	106.2	101.2	97.7	89.1	77.7	68.9
15	131.7	123.2	118.2	114.7	112.0	107.0	103.5	94.9	83.5	74.7
20	135.5	127.0	122.1	118.5	115.8	110.8	107.3	98.7	87.3	78.5
25	138.3	129.8	124.9	121.4	118.6	113.6	110.1	101.6	90.1	81.3
30	140.5	132.1	127.1	123.6	120.8	115.9	112.3	103.8	92.4	83.5
35	142.3	133.9	128.9	125.4	122.7	117.7	114.1	105.6	94.2	85.3
40	143.9	135.4	130.4	126.9	124.2	119.2	115.7	107.1	95.7	86.9
45	145.2	136.7	131.8	128.2	125.5	120.5	117.0	108.4	97.0	88.2
50	146.4	137.9	132.9	129.4	126.7	121.7	118.1	109.6	98.2	89.4
55	147.4	138.9	133.9	130.4	127.7	122.7	119.2	110.6	99.2	90.4
60	148.3	139.8	134.9	131.3	128.6	123.6	120.1	111.5	100.1	91.3
65	149.1	140.7	135.7	132.2	129.4	124.5	120.9	112.4	101.0	92.1
70	149.9	141.4	136.5	132.9	130.2	125.2	121.7	113.2	101.7	92.9
75	150.6	142.1	137.2	133.7	130.9	125.9	122.4	113.9	102.4	93.6

A relative wind heading of 0 degrees is directly toward the modeled receptor location.
A relative wind heading of 180 degrees is directly away from the modeled receptor location.

BLASTNZ1 Scenario:

Noise level scale =	Peak dBC	
Wind speed in mph =	7	mph
Relative wind heading (0 = toward receptor) =	0	degrees
Charge cover in feet =	4.0	feet
Blast spectrum code (1 = commercial explosives, 2 = C4) =	1	
TNT equivalency factor =	0.65	
Terrain shielding/echo factor =	0	dB
Temperature, degrees F =	75	F
Stability (1 = moderately unstable, 2 = slightly unstable, 3 = neutral, 4 = inversion, 5 = mod. focus, 6 = strong focus) =	3	
Percent relative humidity =	35	percent
Study area altitude in feet =	50	feet

Peak dBC	Risk of Complaint:	Peak Overpressure (dB)
< 105 dBC	Low risk of complaint	< 110 dB
105-120 dBC	Moderate risk of complaint	110-125 dB
120-125 dBC	High risk of complaint	125-130 dB
125-135 dBC	Possible damage claims	130-140 dB
> 135 dBC	Possible structural damage	> 140 dB

The BLASTNZ1 model is based on the peak overpressure equation presented in Rodman (1985) plus the buried charge correction equation from Raspet and Bobak (1988). Adjustments for wind conditions use relative wind headings (0 = toward the receptor location). Adjustments for atmospheric stability

C—004230

conditions are based on equations modified from Raspet and Bobak (1988). Atmospheric absorption equations are from Acoustical Society of America (1978). The relative frequency spectrum for commercial explosives is from Rodman (1985). The relative frequency spectrum for military explosives is from U.S. Army Construction Engineering Research Laboratory (1979). TNT equivalency factors taken (in order of priority) from Raspet and Bobak (1988); Esparza (1986); and Baker, et al. (1983).

Acoustical Society of America. 1978. American National Standard Method for the Calculation of Absorption of Sound by the Atmosphere, ANSI S1.26-1978 (ASA 23-1978).

Baker, W. E., P. A. Cox, P. S. Westine, J. J. Kulesz, and R. A. Strehlow. 1983. Explosion Hazards and Evaluation. Elsevier Scientific Publishing Co. New York, NY.

Esparza, E. D. 1986. Blast measurements and equivalency for spherical charges at small scaled distances. International Journal of Impact Engineering 4(1):23-40.

Raspet, R. and Bobak, M. T. 1988. Procedures for Estimating the Flat-weighted Peak Level Produced by Surface and Buried Charges. (USA-CERL TR N-88/07; AD-A199 857.) U.S. Army Corps of Engineers Construction Engineering Research Laboaratory. Champaign, IL.

Rodman, C. W. 1985. Calculation of blast noise using spreadsheet software. Pp. 363-370 in R. Singh, (ed.), NOISE-CON 85 Proceedings: Computers for Noise Control, 1985 National Conference on Noise Control Engineering. Noise Control Foundation. New York, NY.

U.S. Army Construction Engineering Research Laboratory. 1979. Acoustic Directivity Patterns for Army Weapons. (Technical Report N-60.) Champaign, IL.

Peak dBC	Risk of Complaint:	Peak Overpressure (dB)

C-004231

105 dBC	Low risk of complaint	< 110 dB
105-120 dBC	[Mod]erate risk of complaint	110-125 dB
120-125 dBC	High risk of complaint	125-130 dB
125-135 dBC	Possible damage claims	130-140 dB
> 135 dBC	[Pos]sible structural damage	> 140 dB

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GRAPH SET-UP:

	100	200	300	400	500	750	1000	2000	5000	10000
0.5	106.0	97.5	92.6	89.0	86.3	81.3	77.8	69.2	57.8	49.0
5	120.2	111.8	106.8	103.3	100.6	95.6	92.0	83.5	72.1	63.3
25	138.3	129.8	124.9	121.4	118.6	113.6	110.1	101.6	90.1	81.3

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PEAK BLAST NOISE (dBC) FOR TYPICAL CONSTRUCTION BLASTING, 40% STRAIGHT DYNAMITE
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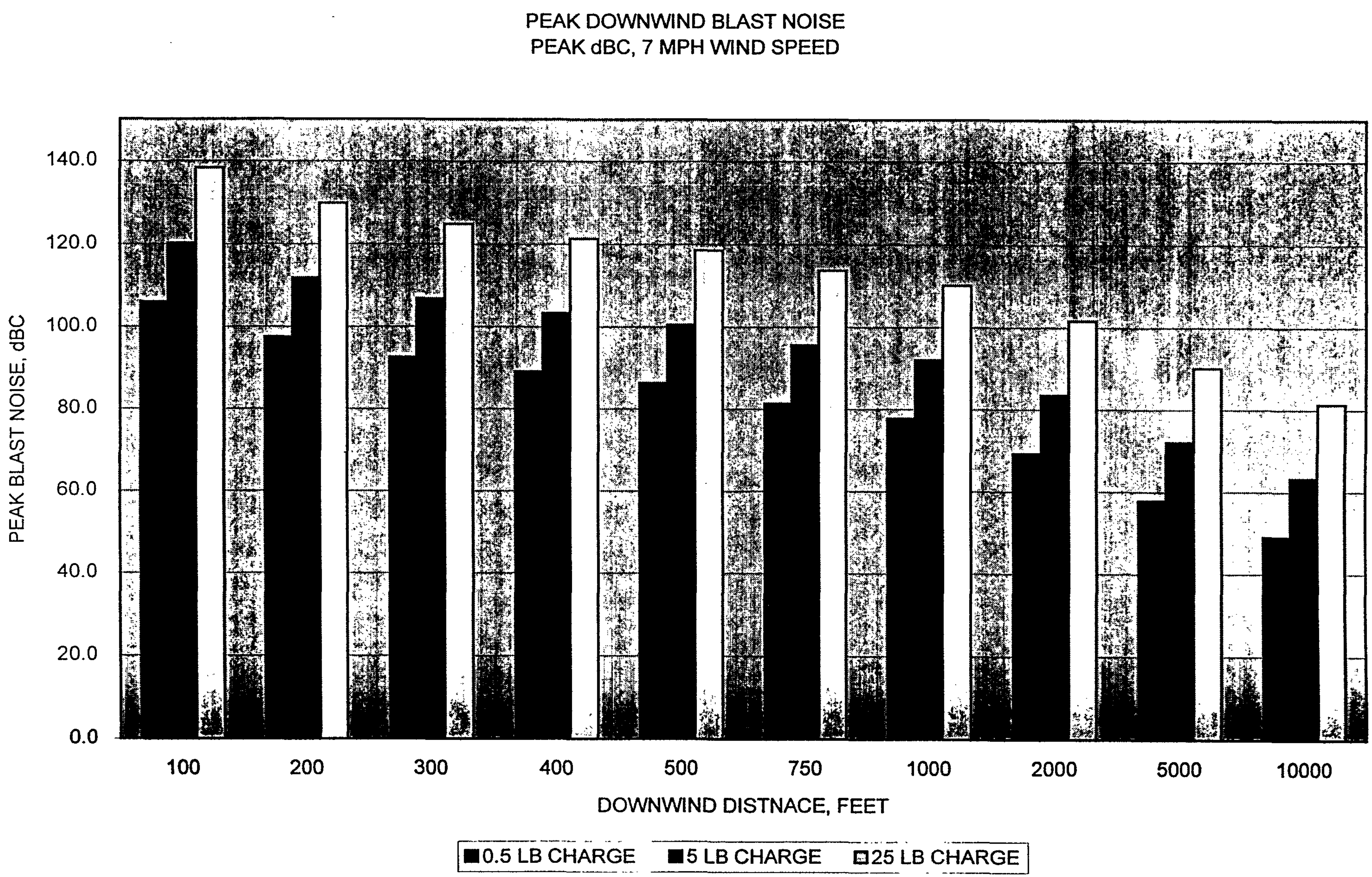
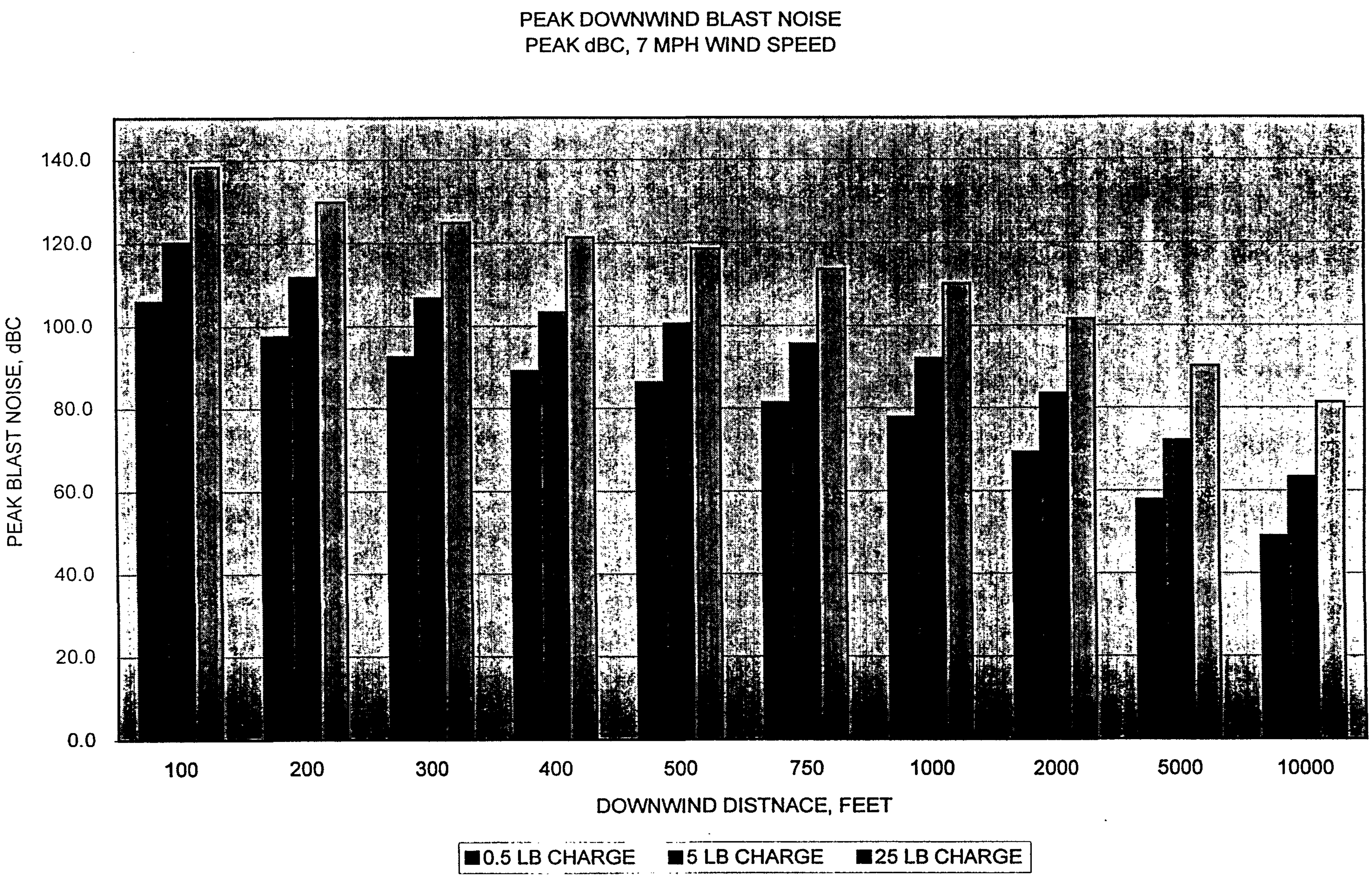

PEAK DOWNWIND BLAST NOISE
PEAK dBC, 7 MPH WIND SPEED
PEAK BLAST NOISE, dBC
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
100
200
300
400
500
750
1000
2000
5000
10000
DOWNWIND DISTNACE, FEET
0.5 LB CHARGE
5 LB CHARGE
25 LB CHARGE

C-004233


PEAK DOWNWIND BLAST NOISE
PEAK dBC, 7 MPH WIND SPEED
PEAK BLAST NOISE, dBC
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
100
200
300
400
500
750
1000
2000
5000
10000
DOWNWIND DISTNACE, FEET
0.5 LB CHARGE
5 LB CHARGE
25 LB CHARGE

C-004234

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8 5 9 9 9 9 9 9 9 9 9 9

PEAK BLAST OVERPRESSURE (dB) FOR TYPICAL CONSTRUCTION BLASTING, 40% STRAIGHT DYNAMITE

PEAK NOISE LEVELS UNDER CONDITIONS OF VARYING CHARGE WEIGHT AND DISTANCE

CHARGE WEIGHT (POUNDS)	RECEPTOR DISTANCE (FEET) 100	200	300	400	500	750	1,000	2,000	5,000	10,000
0.5	116.3	107.8	102.9	99.4	96.6	91.7	88.2	79.7	68.5	60.0
1.0	120.8	112.3	107.4	103.8	101.1	96.2	92.7	84.2	73.0	64.5
2.5	126.4	118.0	113.0	109.5	106.8	101.8	98.3	89.8	78.7	70.2
5.0	130.5	122.1	117.1	113.6	110.9	105.9	102.4	94.0	82.8	74.3
7.5	132.9	124.4	119.5	116.0	113.2	108.3	104.8	96.3	85.1	76.6
10	136.2	127.7	122.8	119.2	116.5	111.6	108.0	99.6	88.4	79.9
15	142.0	133.5	128.5	125.0	122.3	117.4	113.8	105.4	94.2	85.7
20	145.8	137.3	132.4	128.9	126.1	121.2	117.7	109.2	98.0	89.5
25	148.6	140.1	135.2	131.7	129.0	124.0	120.5	112.0	100.8	92.4
30	150.8	142.4	137.4	133.9	131.2	126.2	122.7	114.2	103.0	94.6
35	152.6	144.2	139.2	135.7	133.0	128.0	124.5	116.0	104.9	96.4
40	154.2	145.7	140.8	137.2	134.5	129.6	126.0	117.6	106.4	97.9
45	155.5	147.0	142.1	138.6	135.8	130.9	127.4	118.9	107.7	99.2
50	156.6	148.2	143.2	139.7	137.0	132.0	128.5	120.1	108.9	100.4
55	157.7	149.2	144.3	140.7	138.0	133.1	129.5	121.1	109.9	101.4
60	158.6	150.1	145.2	141.7	138.9	134.0	130.5	122.0	110.8	102.3
65	159.4	151.0	146.0	142.5	139.8	134.8	131.3	122.8	111.7	103.2
70	160.2	151.7	146.8	143.3	140.5	135.6	132.1	123.6	112.4	104.0
75	160.9	152.4	147.5	144.0	141.2	136.3	132.8	124.3	113.1	104.7

A relative wind heading of 0 degrees is directly toward the modeled receptor location.
A relative wind heading of 180 degrees is directly away from the modeled receptor location.

BLASTNZ1 Scenario:

Parameter	Value	Unit
Noise level scale =	Peak Overpressure (dB)	
Wind speed in mph =	7	mph
Relative wind heading (0 = toward receptor) =	0	degrees
Charge cover in feet =	4.0	feet
Blast spectrum code (1 = commercial explosives, 2 = C4) =	1	
TNT equivalency factor =	0.65	
Terrain shielding/echo factor =	0	dB
Temperature, degrees F =	75	F
Stability (1 = moderately unstable, 2 = slightly unstable, 3 = neutral, 4 = inversion, 5 = mod. focus, 6 = strong focus) =	3	
Percent relative humidity =	35	percent
Study area altitude in feet =	50	feet

Peak dBC	Risk of Complaint:	Peak Overpressure (dB)
< 105 dBC	Low risk of complaint	< 110 dB
105-120 dBC	Moderate risk of complaint	110-125 dB
120-125 dBC	High risk of complaint	125-130 dB
125-135 dBC	Possible damage claims	130-140 dB
> 135 dBC	Possible structural damage	> 140 dB

The BLASTNZ1 model is based on the peak overpressure equation presented in Rodman (1985) plus the buried charge correction equation from Raspet and Bobak (1988). Adjustments for wind conditions use relative wind headings (0 = toward the receptor location). Adjustments for atmospheric stability

conditions are based on equations modified from Raspet and Bobak (1988). Atmospheric absorption equations are from Acoustical Society of America (1978). The relative frequency spectrum for commercial explosives is from Rodman (1985). The relative frequency spectrum for military explosives is from U.S. Army Construction Engineering Research Laboratory (1979). TNT equivalency factors taken (in order of priority) from Raspet and Bobak (1988); Esparza (1986); and Baker, et al. (1983).

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Peak dBC	Risk of Complaint:	Peak Overpressure (dB)

105 dBC   Low risk of complaint   < 110 dB
105-120deBate risk of complaint   110-125 dB
120-125 dBIgh risk of complaint   125-130 dB
125-135 dBCssible damage claims   130-140 dB
> 135 dBCible structural damage   > 140 dB

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GRAPH SET-UP:

	100	200	300	400	500	750	1000	2000	5000	10000
0.5	116.3	107.8	102.9	99.4	96.6	91.7	88.2	79.7	68.5	60.0
5	130.5	122.1	117.1	113.6	110.9	105.9	102.4	94.0	82.8	74.3
25	148.6	140.1	135.2	131.7	129.0	124.0	120.5	112.0	100.8	92.4

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Print Macro ^P
/ppcaos\027E~qcaoml13~mr116~mt2~mb0~p60~
s\027(8U\027(s0p16h0s3b4102T~h|
PEAK BLAST OVERPRESSURE (dB) FOR TYPICAL CONSTRUCTION BLASTING, 40% STRAIGHT DYNAMITE
~qrPART2~agpcrrPART3~gpcaos\027E~qcaq
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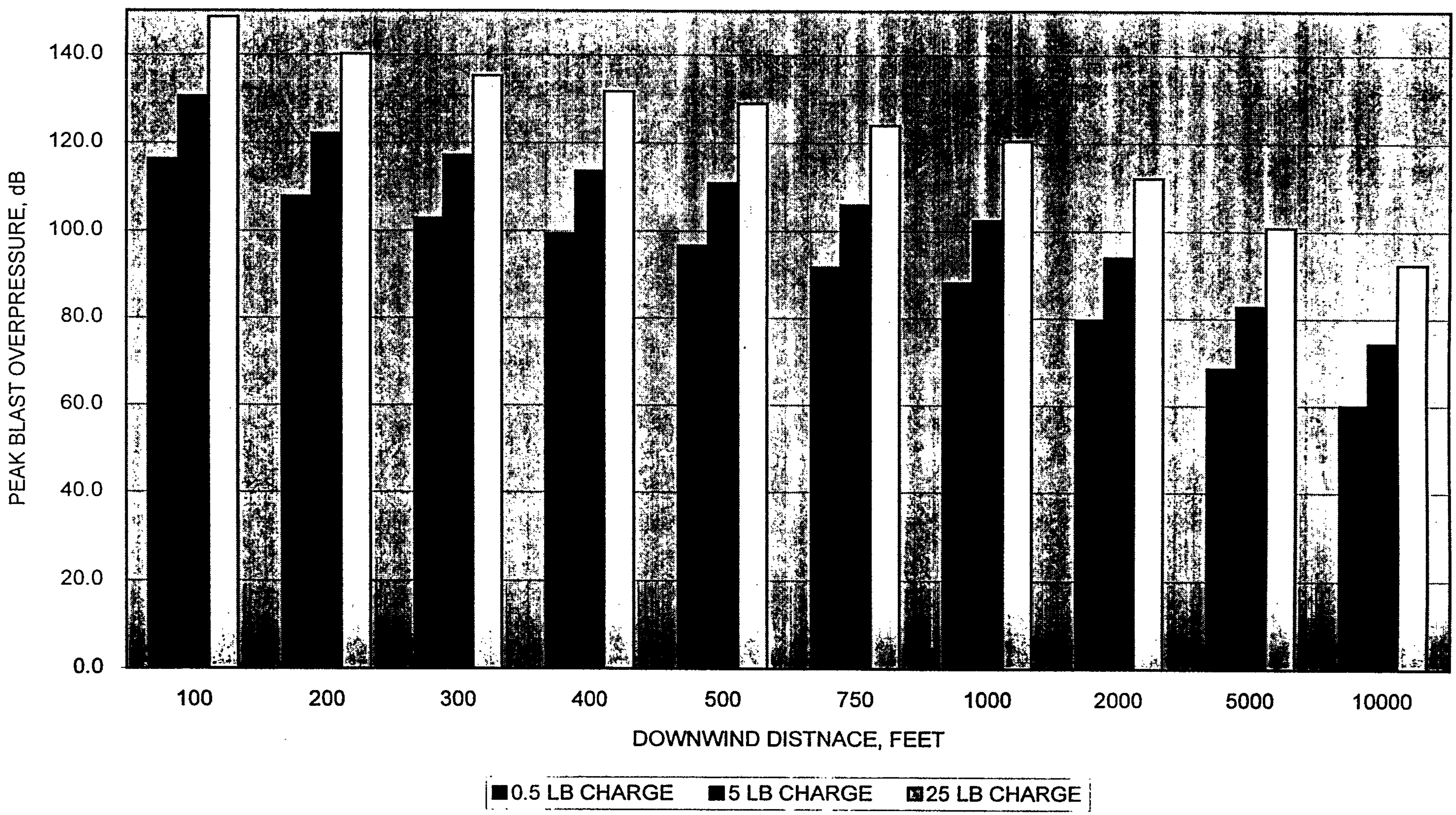
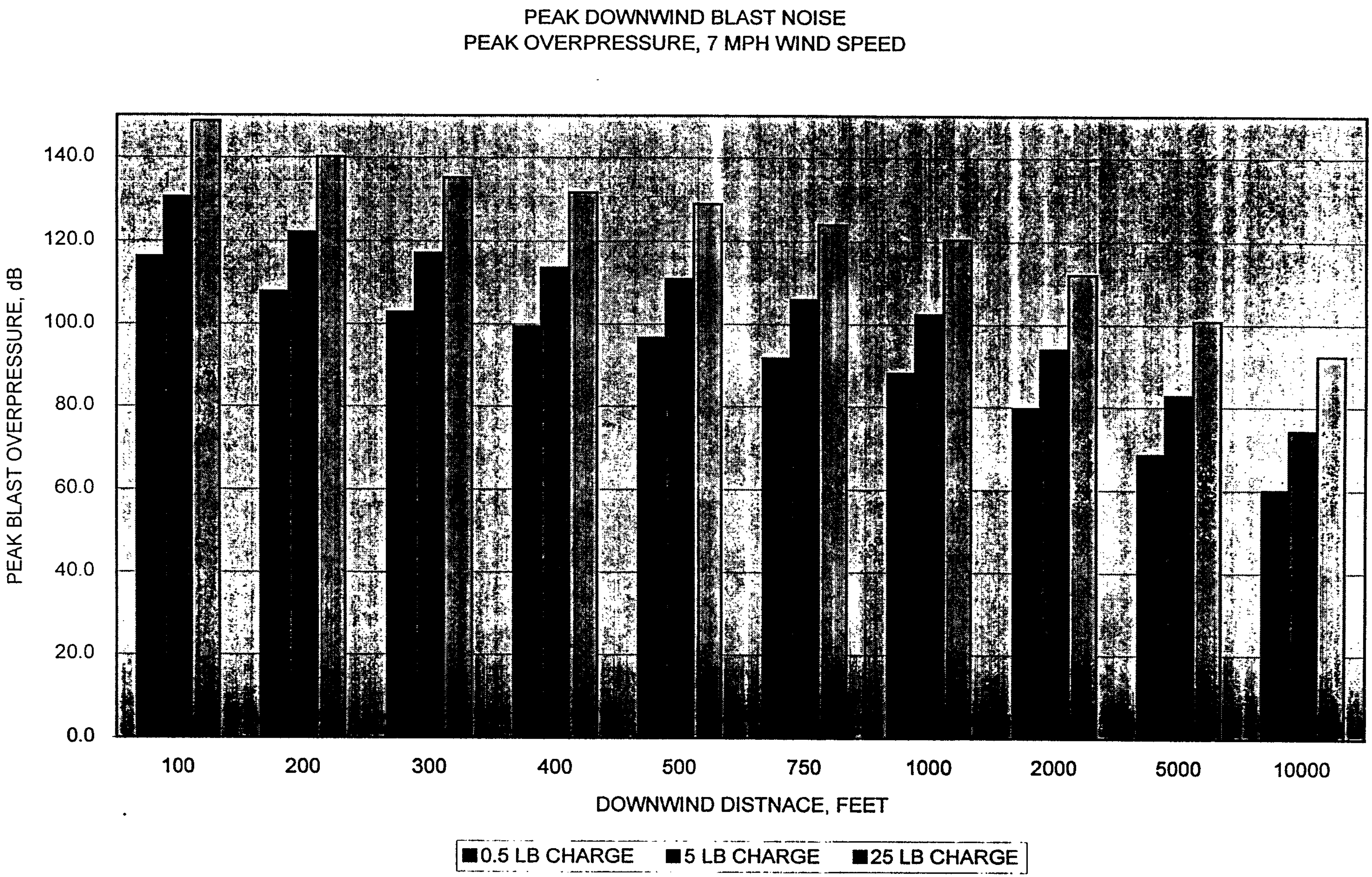
C-004238

PEAK DOWNWIND BLAST NOISE
PEAK OVERPRESSURE, 7 MPH WIND SPEED



C-004240



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